

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Müller, et al.
Serial No.: 10/027,977
Date Filed: December 20, 2001
Title: METHOD FOR INCREASING THE LONG-TERM STABILITY OF
EXHAUST SYSTEM CATALYSTS
Art Unit: 1754
Examiner: T. Vanoy

October 24, 2003

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ATTENTION: BOARD OF PATENT APPEALS AND INTERFERENCES

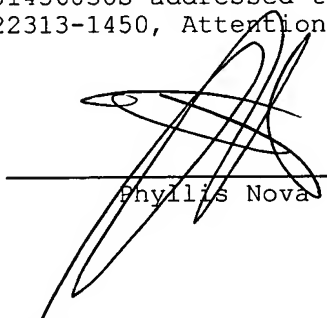
TRANSMITTAL OF APPEAL BRIEF

1. Transmitted herewith, in triplicate, is an Appeal Brief in this application, for which a Notice of Appeal was filed on April 24, 2003 and a Petition and Fee for Extension of Time C.F.R. 1.17(a)).
2. Applicant is other than a small entity.
3. The fee associated with the Appeal Brief (37 C.F.R. 1.17(c)) is \$330.00.

CERTIFICATE OF MAILING UNDER 37 C.F.R. 1.10

I hereby certify that this correspondence (along with any paper referenced as being attached or enclosed) is being deposited on the date shown below with the United States Postal Service in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EV328145683US addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, Attention: Board of Patent Appeals And Interferences.

Date: October 24, 2003



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October 24, 2003
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4. The fee associated with the Petition and Fee for Extension of Time (37 C.F.R. 1.17(a)(4)) is \$1,480.00.
5. No additional fee for claims is required.

FEE PAYMENT

6. X Charge account number 05-1070 the sum of \$1,810.00.
A duplicate of this transmittal is attached.
7. X If any additional fees for the Appeal Brief, Extension
and/or any other fee is required, charge account number
05-1070.
8. X If any additional fee for claims is required, charge account
number 05-1070.


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IN DUPLICATE

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APPELLANTS' BRIEF (37 C.F.R. 1.192)

This is an appeal from the final rejection dated November 25, 2002, a Notice of Appeal having been filed on April 24, 2003. A Petition for a four-month extension of time and the requisite fee is being submitted herewith.

The fees required under Section 1.17(a), and any required petition for extension of time for filing this brief and fees therefor, are addressed in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief is transmitted in triplicate. (37 CFR 1.192(a))

This brief contains the items set forth in the Table of Contents under the following headings as set forth below (37 CFR 1.192(c)):

CERTIFICATE OF MAILING UNDER 37 C.F.R. 1.10

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Date: October 24, 2003

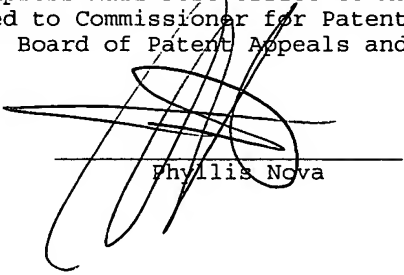

Phyllis Nova

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APPELLANTS' BRIEF (37 C.F.R. 1.192)

This is an appeal from the final rejection dated November 25, 2002, a Notice of Appeal having been filed on April 24, 2003. A Petition for a four-month extension of time and the requisite fee is being submitted herewith.

1. REAL PARTY INTEREST

The real party interest of the subject patent application is Engelhard Corporation with headquarters at 101 Wood Avenue, Iselin, New Jersey 08830-0770.

2. RELATED APPEALS AND INTERFERENCES

There are no related pending appeals or interferences.

3. STATUS OF CLAIMS

The claims pending in this application are claims 1-4, all of said claims are on appeal. Original claims 5 and 6 have been cancelled.

4. STATUS OF AMENDMENTS

The following amendment was made and entered in the parent application:

December 20, 2001, in this preliminary amendment, amendments were made to claims 1-4 and claims 5 and 6 were cancelled.

November 6, 2002, a response was made to the Office Action dated May 9, 2002. No amendments were made.

5. SUMMARY OF INVENTION

The present invention is directed to a method of increasing the stability of catalysts for purifying exhaust gases of an internal combustion engine wherein the exhaust gas comprises volatile phosphorus compounds. The method comprises metering the metal or metal compound for conversion of the volatile phosphorus compound into fine, inert, non-volatile solid compounds in the exhaust gas of the catalyst. The metal compounds are provided separately from the engine oil and the fuel upstream of the catalyst. The non-volatile solid particles are so fine that they pass unstopped through the entire exhaust. (Claim 1)

Preferably, the volatile phosphorus compounds in the exhaust gas are removed by reactions of the metal or metal compound which form solid metal-phosphorus compounds with the volatile phosphorus compounds. (Claim 2) The metal or metal compound for conversion of the volatile phosphorus compound can be selected from the group consisting of Li, Na, K, Cu, Ag, Mg, Ca, Zn, Al, Y and rare earth metals and metal compounds. (Claim 4) Calcium or a calcium compound are preferably used as the metal or metal compound. (Claim 3)

6. STATEMENT OF ISSUES

6.1 Whether claims 1-4 are unpatentable under 35 USC 103(a) as obvious over U.S. Patent No. 5,316,738 to Kojima et al. in view of U.S. Patent No. 3,211,534 to Ridgeway.

7. GROUPING OF CLAIMS

All of claims will stand or fall together.

8. ARGUMENTS

8.1 Summary of the Rejection under 35 USC § 103

The claims have been rejected over U.S. Patent No. 5,316,738 to Kojima et al. ("Kojima") in view of U.S. Patent No. 3,211,534 to Ridgeway ("Ridgeway"). Reference is made to the Office Action dated November 25, 2002 at pages 2-13.

Kojima is cited as disclosing the prevention of poisoning automotive exhaust treatment catalysts by phosphorous compounds. This is accomplished by providing a phosphorous absorbing compound such as calcium or magnesium chlorides, nitrates, carbonates, etc. supported on a cordierite honeycomb substrate at a location adjacent to the noble metal catalyst so that the exhaust gas initially contact the phosphorus-sorbing Group IIA metal components. (O.A. page 3, lines 5-15)

Additionally Kojima is cited that Group IIA element compounds are added to gasoline, "evidently to also prevent poisoning of the noble metal catalyst with phosphorus components". (O.A. page 3, lines 16-19)

The Examiner concludes that, "obviously the gasoline combusting the Groups IIA metal compound is going to produce an exhaust gas with the Group IIA metal compound "metered" into it at a location upstream of the catalyst". (O.A. page 3, line 19 to page 4, line 2)

The Examiner recognizes the deficiency of Kojima: "The difference between the Applicants' claims and the Kojima patent is that the Applicants' have amended their claim 1 to require that the metal/metal compound is metered into the exhaust gas *separately from the engine oil or fuel*, whereas col. 7 lines 15-24 in Kojima at least fairly suggests that *the metal/metal compound may be dispersed into the gasoline* (evidently, so that the exhaust gas carries the metal/metal compound from the gasoline combustion pistons)." (O.A. page 4 first full paragraph)

Ridgway is cited for the assertion that, "dispersion of the metal/metal compounds into the fuel (as the Applicants' argue is the case for U.S. Pat. 5,316,738) and the direct injection of the metal/metal compounds into the exhaust gas (which appears to be what the Applicants argue is the case for the pending claims) are equivalent techniques for achieving the same purpose entraining the metal/metal compound into the exhaust gas for reaction with the catalyst poison." (O.A. page 4 second full paragraph)

The Examiner concludes that it would have been obvious to modify the process described in Kojima by substituting the technique of directly injecting metal/metal compounds into the exhaust gas disclosed at col. 15, lines 69-72 in Ridgway in lieu of the technique of dispersing the metal/metal compounds into the gasoline as described in col. 7, lines 15-24 in Kojima. The basis for this substitution is the assertion that the substitution of such art-recognized equivalents is obvious.

8.2 Arguments - The Present Invention Is Not Obvious over the Cited Art, Rejections under 35 USC § 103

Kojima

The difference between the claims of the present invention and Kojima is that the present claims call for metering a metal or metal compound into the exhaust gas, separately from the engine oil and the fuel, for conversion of the volatile phosphorus compound into non-volatile solid compounds. The result is inert, non-volatile solid particles which are so fine that they pass unstopped through the entire exhaust. Kojima is cited as disclosing that in order to prevent poisoning by phosphorus and/or silicon compounds of a catalytic converter, a poisoning-preventive supported layer is required. The layer is shown to be located at the catalyst. (O.A. page 3, lines 5-15) This disclosure in Kojima is different than the present invention, as recited in Claim 1, which is directed to a method wherein no such

layer is required. Furthermore, there is no disclosure or suggestion in Kojima that the use of the metal or metal compound on a layered honeycomb would result conversion of the volatile phosphorus compound into fine, inert, non-volatile solid compounds, wherein the non-volatile solid particles are so fine that they pass unstopped through the entire exhaust system. Furthermore, there is no disclosure in Kojima to meter the metal or metal compound separately from the engine oil and the fuel, upstream of the catalyst as presently claimed. Rather, in this embodiment of Kojima the metal or metal or metal compound is disclosed to be in the "layer".

Kojima is also cited at col. 7, lines 15-24 as disclosing that, "the metal /metal compounds may be dispersed into the gasoline (evidently, so that the exhaust gas carries the metal/metal compound from the gasoline combustion pistons)." (O.A. page 4, lines 6-8). Kojima discloses that the "Group IIa element compound is not particularly limited, but is preferably soluble or uniformly dispersible in gasolines, such as, example, an organic acid salt, an organometallic compound, etc. For the purpose of improving the dispersibility of the compound, the gasoline composition may further contain a dispersant." (Kojima col. 7, lines 18-24) This approach by Kojima requires at least one additional material to be run through the engine. It also teaches that it there is concern about dispersion and a dispersant is preferable. There is no disclosure of separate metering, separately from the fuel, of the metal or metal compound into the exhaust gas. Nor is there a disclosure or suggestion of the form of the resultant phosphorous compound adsorbed material as to whether fine particles result, and/or if the resulting material passes through the entire exhaust system as presently claimed. The present invention provides for metering a metal or metal compound separately from the engine oil and the fuel, upstream of the catalyst. This is not disclosed or suggested and results in the ability to directly and separately control the metal or metal compound into the exhaust gas, to result in the non-volatile solid particles being so fine that they

pass unstopped through the entire exhaust system, as presently claimed.

For the above reasons, present claims 1-4 are not disclosed or suggested by Kojima.

Ridgway

In order to compensate for the deficiency of Kojima, it is combined with the disclosure of Ridgway. Ridgway is cited as disclosing, "a similar method" (O.A., page 4, line 9) for removing catalyst poisons (i.e., lead compounds) out of exhaust gases from internal combustion engines by spraying reactants (i.e., copper and vanadium oxides) into the exhaust gas. In particular Ridgway is cited at column 15, lines 1-72.

For the reasons that follow Ridgway does not disclose or suggest the presently claimed invention and cannot be combined with Kojima to make the present invention obvious. Initially, there is no disclosure in Ridgway to address poisoning of the catalyst by volatile phosphorus compounds. Ridgway is concerned about lead poisoning of catalysts. Ridgway's approach is not to use a metal or metal compound for conversion of the poison. Rather Ridgway addresses the poisoning problem by adding additional catalyst either to the combustion chamber (col. 15, line 19) or alternatively into the exhaust stream (col. 15, line 72). Therefore, Ridgway is directed to a completely different method than either Kojima or the presently claimed invention. In particular, Ridgway discloses the addition of copper and vanadium oxides as catalysts and not to react with the lead. (Ridgway, column 15, lines 15-32)

There is no motivation for one skilled in the art to add a metal or metal compound, to convert a volatile poison (i.e. phosphorous compound to a non-volatile solid compound), to the exhaust stream of Kojima upstream of the catalyst based on the disclosure of adding additional catalysts to the system as disclosed in Ridgway. This is particularly the case where Ridgway is directed to avoiding lead

poisoning and Kojima is directed to addressing poisons (e.g. phosphorous). In particular, it would not be obvious to combine the disclosure of Kojima which is directed to treating phosphorus and silicon poisons using Group IIA compounds, with the disclosure of Ridgway which is directed to the avoiding lead poison and not treating the poison (lead). Ridgway uses copper (Group IB) and vanadium (Group VB) compounds as exhaust treatment catalysts which are added to the exhaust steam. Such materials are not disclosed by Ridgway for use to treat catalyst poisons. There is no basis or motivation for the skilled artisan to combine such disclosure of different methods relating to different chemical reactions.

Additionally, Ridgway does not disclose or suggest the treatment of volatile phosphorus compounds as recited in claim 1. Nor does Ridgway disclose or suggest specific embodiments of the present invention such as the use of Group 1A, 2A, or 3A metals as recited in amended claim 4.

The "Response to Arguments" beginning at page 5 of the Office Action, does not provide any basis for obviousness of the claimed step of, "metering a metal or metal compound for conversion of the volatile phosphorus compound into non-volatile solid compounds in the form of fine inert solid particles into the exhaust gas, separately from the engine oil and the fuel". Kojima makes no disclosure of adding anything to the exhaust gas, and Ridgway is adding additional "catalyst" to the exhaust stream. The arguments provide no basis in the references to render the present claims obvious.

Accordingly, reversal and withdrawal of the rejection that any of claims 1-4, as obvious over Kojima as obvious in view of Ridgway is respectfully requested.

9. CONCLUSION

For the reasons given above, reversal of the rejection of the claims 1-4 of the above referenced application as obvious over the cited art is respectfully requested.

10. APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

(see attached)

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Respectfully submitted,


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APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

The claims on appeal read as follows:

1. A method of increasing the stability of catalysts for purifying exhaust gases of an internal combustion engine of the type which combusts fuel and uses engine oil and which has an exhaust system, wherein the exhaust gas comprises volatile phosphorus compounds, comprising: metering a metal or metal compound for conversion of the volatile phosphorus compound into non-volatile solid compounds in the form of fine inert solid particles into the exhaust gas, separately from the engine oil and the fuel, upstream of the catalyst, wherein the non-volatile solid particles are so fine that they pass unstopped through the entire exhaust system.
2. The method as claimed in claim 1, wherein the volatile phosphorus compounds in the exhaust gas are removed by reactions of the metal or metal compound which form solid metal-phosphorus compounds with the volatile phosphorus compounds.
3. The method as claimed in claim 2, wherein calcium or a calcium compound is used as the metal or metal compound.
4. The method as claimed in claims 1 or 2, wherein the metal or metal compound for conversion of the volatile phosphorus compound is selected from the group consisting of Li, Na, K, Cu, Ag, Mg, Ca, Zn, Al, Y and rare earth metals and metal compounds.